



Application No. 10/530,290
Reply to the Office Action of May 31, 2006

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AMENDMENTS TO THE CLAIMS

1-83. (Canceled)

84. (Currently Amended) A method of predictably enhancing the nutrient value of distillers, brewers or fermenters grain byproducts, and of producing a protein feed or feed supplement end product for ruminant animals having a crude protein content of over about 30% of the feed or feed supplement end product composition on a dry matter basis, and at least one of (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) a post ruminal digestibility of the UIP/RUP of over 60%, comprising:

determining the desirable levels of crude protein, UIP/RUP, amino acids and post ruminal digestibility in an end product;

creating a distillation and/or fermentation by-product-nutrient source mixture having an enhanced nutrient value by (a) adding one or more crude protein and/or amino acid content nutrient sources comprising canola meal, soybean meal, sunflower meal into the wet end of distillation or fermentation byproducts based on the crude protein, UIP protein, amino acid content, UIP/RUP amino acid content of the added nutrient sources to create an enhanced nutrient value by-product-nutrient source mixture of the distillation or fermentation byproducts; and (b) adjusting the temperature and/or the moisture content of the enhanced nutrient value by-product-nutrient source mixture based on an empirical relationship that relates the UIP as a percent of the crude protein (CP) to an end product temperature to produce said end product having a crude protein content of over about 30% of the end product composition on a dry matter basis, and at least one of (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) a post ruminal digestibility of the UIP/RUP of over 60%.

85. (Previously Presented) The end product made by the process of claim 84.

86. (Currently Amended) ~~The method of claim 84,~~ A method of predictably enhancing the nutrient value of distillers, brewers or fermenters grain byproducts, and of producing a protein feed or feed supplement end product for ruminant animals having a crude protein content of over about 30% of the feed or feed supplement end product composition on a dry matter basis, and at least one of (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) a post ruminal digestibility of the UIP/RUP of over 60%, comprising:

determining the desirable levels of crude protein, UIP/RUP, amino acids and post ruminal digestibility in an end product;

creating a distillation and/or fermentation by-product-nutrient source mixture having an enhanced nutrient value by (a) adding one or more crude protein and/or amino acid content nutrient sources comprising canola meal, soybean meal, sunflower meal into the wet end of distillation or fermentation byproducts based on the crude protein, UIP protein, amino acid content, UIP/RUP amino acid content of the added nutrient sources to create an enhanced nutrient value by-product-nutrient source mixture of the distillation or fermentation byproducts; and (b) adjusting the temperature and/or the moisture content of the enhanced nutrient value by-product-nutrient source mixture based on an empirical relationship that relates the UIP as a percent of the crude protein (CP) to an end product temperature to produce said end product having a crude protein content of over about 30% of the end product composition on a dry matter basis, and at least one of (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) a post ruminal digestibility of the UIP/RUP of over 60%;

wherein the UIP as a percent of the crude protein (CP) is adjusted according to the following formula:

$$\text{UIP (\% of CP)} = (\text{End Product Temperature} \times 0.819) - 107.644;$$

87. (Previously Presented) The method of claim 84, rumen undegradable protein (RUP/UIP) is increased in a range of from about 27% to about 83%.

88. (Previously Presented) The method of claim 84, wherein the end product moisture level is in a range from about 0% to about 14%.

89. (Previously Presented) The method of claim 84, wherein the UIP, on a crude protein basis, is increased by about 115 percent; methionine, as a percentage of UIP, is increased about 30 percent; UIP methionine, as a percentage of dry matter, is increased by about 179 percent; lysine, as a percentage of UIP is decreased by about 3.4 percent; and UIP lysine, as a percentage of dry matter, is increased by about 108 percent.

90. (Previously Presented) The method of claim 84, wherein the UIP, on a crude protein basis, is increased by about 108 percent; methionine, as a percentage of UIP, is increased about 30 percent; UIP methionine, as a percentage of dry matter, is increased by about 169 percent; lysine, as a percentage of UIP is decreased by about 1.0 percent; and UIP lysine, as a percentage of dry matter, is increased by about 111 percent.

91. (Previously Presented) The method of claim 84, wherein the distillation and/or fermentation by-product-nutrient source mixture having an enhanced nutrient value is a mixture of about two-thirds wet corn distillers grains and about one third high protein soybean meal.

92. (Previously Presented) The method of claim 84, wherein the end product crude protein is in a range up to about 54 percent of the end product composition.

93. (Previously Presented) The method of claim 84, wherein the end product UIP is in a range from about 63% to about 83 percent of the end product composition.

94. (Previously Presented) The method of claim 84, wherein the UIP content of the end product has a pepsin digestibility in a range of about 74% to about 94%.

95. (Previously Presented) The method of claim 84, wherein the crude protein range in the end product is from about 30% to about 54%; the UIP range in the end product is from about 63% to about 83%; and the post ruminal pepsin digestibility range is from about 63% to about 94%.

96. (Currently Amended) The method of claim 84, wherein the bypass protein (RUP/UIP) level of the end product that is over 50% and up to about 83% of the crude protein is adjusted and is increased in a range from approximately one and one-fourth times to approximately two and one-half times the bypass protein (RUP/UIP) level in the by-product-nutrient source mixture.

97. (Currently Amended) The method of claim 84, wherein the temperature of mixture is increased ~~rapidly~~ to a range of about 208 degrees Farenheit to about 210 degrees Farenheit.

98. (Currently Amended) The method of claim 84, wherein the ~~drying~~ temperature is adjusted over a range from about 350 degrees Farenheit to about 500 degrees Farenheit.

99. (Previously Presented) The method of claim 84, wherein the temperature is adjusted to achieve an end product temperature in a range of from about 211 degrees Farenheit to about 223 degrees Farenheit.

100. (Previously Presented) The method of claim 84, wherein the temperature is in a range that causes denaturation of the protein of the by-product-nutrient source mixture.

101. (Previously Presented) The method of claim 84, wherein temperature of the by-product mixture is adjusted in a range from about 180°F to about 250°F.

102. (Previously Presented) The method of claim 84, wherein the temperature of the by-product mixture is adjusted to be about 218°F.

103. (Currently Amended) A method of predictably enhancing the nutrient value of distillers, brewers or fermenters grain byproducts, and of producing a protein feed or feed supplement end product for ruminant animals having a crude protein content of over about 30% of the feed or feed supplement end product composition on a dry matter basis, and at least two of (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) a post ruminal digestibility of the UIP/RUP of over 60%, comprising:

determining the desirable levels of crude protein, UIP/RUP, amino acids and post ruminal digestibility in an end product;

creating a distillation and/or fermentation by-product-nutrient source mixture having an enhanced nutrient value by (a) adding one or more crude protein and/or amino acid content nutrient sources comprising canola meal, soybean meal, sunflower meal into the wet end of distillation or fermentation byproducts based on the crude protein, UIP protein, amino acid content, UIP/RUP amino acid content of the added nutrient sources; and (b) adjusting the temperature and/or the moisture content of the enhanced nutrient value by-product-nutrient source mixture based on an empirical relationship that relates the UIP as a percent of the crude protein (CP) to an end product temperature to create an enhanced nutrient value by-product-nutrient source mixture of the distillation or fermentation byproducts to produce said end product having a crude protein content of over 30% on a dry matter basis of the end product composition, and at least two of (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) a post ruminal digestibility of the UIP/RUP of over 60%.

104. (Previously Presented) The end product made by the process of claim 103.

105. (Currently Amended) A method of predictably enhancing the nutrient value of distillers, brewers or fermenters grain byproducts, and of producing a protein feed or feed supplement end product animals having a crude protein content of over about 30% of the feed or feed supplement end product composition on a dry matter basis, and a UIP/RUP content of over 50% and up to about 83% of the crude protein, amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, and a post ruminal digestibility of the UIP/RUP of over 60%, comprising:

determining the desirable levels of crude protein, UIP/RUP, amino acids and post ruminal digestibility in an end product;

creating a distillation and/or fermentation by-product-nutrient source mixture having an enhanced nutrient value by (a) adding one or more crude protein and/or amino acid content nutrient sources comprising canola meal, soybean meal, sunflower meal into the wet end of distillation or fermentation byproducts based on the crude protein, UIP protein, amino acid content, UIP/RUP amino acid content of the added nutrient sources; and (b) adjusting the temperature and/or the moisture content of the enhanced nutrient value by-product-nutrient source mixture based on an empirical relationship that relates the UIP as a percent of the crude protein (CP) to an end product temperature to create an enhanced nutrient value by-product-nutrient source mixture of the distillation or fermentation byproducts to produce said end product having a crude protein content of over 30% on a dry matter basis of the end product composition, a UIP/RUP content of over 50% and up to about 83% of the crude protein, amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, and a post ruminal digestibility of the UIP/RUP of over 60%.

106. (Currently Amended) The method of claim 105, wherein the bypass protein (RUP/UIP) level of the end product that is over 50% and up to about 83% of the crude protein is adjusted and is increased in a range from approximately one and one-fourth times to approximately two and one-half times the bypass protein (RUP/UIP) level in the by-product-nutrient source mixture.

107. (Previously Presented) The end product made by the process of claim 105.

108. (Previously Presented) The end product made by the process of claim 106.

109. (Currently Amended) A system for predictably enhancing the nutrient value of distillers, brewers or fermenters grain byproducts, and for producing a protein feed or feed supplement end product for ruminant animals having a crude protein content of over 30% of the feed or feed supplement end product composition on a dry matter basis, and at least one of (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein of, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) having a post ruminal digestibility of the UIP/RUP of over 60%, comprising:

system determining means for determining the desirable levels of crude protein, UIP/RUP, amino acids and post ruminal digestibility in an end product;

system mixing means for creating a distillation and/or fermentation by-product-nutrient source mixture having an enhanced nutrient value by (a) adding one or more crude protein and/or amino acid content nutrient sources comprising canola meal, soybean meal, sunflower meal into the wet end of distillation or fermentation byproducts based on the crude protein, UIP protein, amino acid content, UIP/RUP amino acid content of the added nutrient sources; and (b) system adjusting means for adjusting the temperature and/or the moisture content of the enhanced nutrient value by-product-nutrient source mixture based on an empirical relationship that relates the UIP as a percent of the crude protein (CP) to an end product temperature to create an enhanced nutrient value by-product-nutrient source mixture of the distillation or fermentation byproducts to produce said end product having a crude protein content of over 30% of the end product composition on a dry matter basis, and at least one of (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) a post ruminal digestibility of the UIP/RUP of over 60%

110. (Currently Amended) The system of claim 109, wherein the bypass protein (RUP/UIP) level of the end product that is over 50% and up to about 83% of the crude protein is adjusted and is increased in a range from approximately one and one-fourth times to approximately two and one-half times the bypass protein (RUP/UIP) level in the by-product-nutrient source mixture.

111. (Previously Presented) The system of claim 109, wherein the system adjusting means is provided for providing the temperature in a range that causes denaturation of the protein of the by-product nutrient source mixture.

112. (Currently Amended) A method of predictably enhancing the nutrient value of distillers, brewers or fermenters grain solubles, and of producing a protein feed or feed supplement end product for ruminant animals having a crude protein content of over 30% on a dry matter basis of the feed or feed supplement end product composition, and at least one of (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) having a post ruminal digestibility of the UIP/RUP of over 60%, comprising:

determining the desirable levels of crude protein, UIP/RUP, amino acids and post ruminal digestibility in an end product;

creating a distillation and/or fermentation solubles-nutrient source mixture having an enhanced nutrient value by (a) adding one or more crude protein and/or amino acid content nutrient sources comprising canola meal, soybean meal, sunflower meal into the wet end of distillation or fermentation solubles based on the crude protein, UIP protein, amino acid content, UIP/RUP amino acid content of the added nutrient sources; and (b) adjusting the temperature and/or the moisture content of the enhanced nutrient value solubles-nutrient source mixture based on an empirical relationship that relates the UIP as a percent of the crude protein (CP) to an end product temperature to create an enhanced nutrient value by-product-nutrient source mixture of the distillation or fermentation byproducts to produce said end product having a crude protein content of over 30% on a dry matter basis of the end product composition, and at least

one of (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) a post ruminal digestibility of the UIP/RUP of over 60%.

113. (Previously Presented) The end product made by the process of claim 112.

114. (Currently Amended) A method of predictably enhancing the nutrient value of distillers, brewers or fermenters grain solubles, and of producing a protein feed or feed supplement end product for ruminant animals having a crude protein content of over 30% on a dry matter basis of the feed or feed supplement end product composition, and at least two of (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) having a post ruminal digestibility of the UIP/RUP of over 60%, comprising:

determining the desirable levels of crude protein, UIP/RUP, amino acids and post ruminal digestibility in an end product;

creating a distillation and/or fermentation solubles-nutrient source mixture having an enhanced nutrient value by (a) adding one or more crude protein and/or amino acid content nutrient sources comprising canola meal, soybean meal, sunflower meal into the wet end of distillation or fermentation solubles based on the crude protein, UIP protein, amino acid content, UIP/RUP amino acid content of the added nutrient sources; and (b) adjusting the temperature and/or the moisture content of the enhanced nutrient value solubles-nutrient source mixture based on an empirical relationship that relates the UIP as a percent of the crude protein (CP) to an end product temperature to create an enhanced nutrient value by-product-nutrient source mixture of the distillation or fermentation byproducts to produce an end product having a crude protein content of over 30% on a dry matter basis of the end product composition, and at least two of (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) a post ruminal digestibility of the UIP/RUP of over 60%.

115. (Currently Amended) A method of predictably enhancing the nutrient value of distillers, brewers or fermenters grain solubles, and of producing a protein feed or feed supplement end product for ruminant animals having a crude protein content of over 30% on a dry matter basis of the feed or feed supplement end product composition, and (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, and (3) having a post ruminal digestibility of the UIP/RUP of over 60%, comprising:

determining the desirable levels of crude protein, UIP/RUP, amino acids and post ruminal digestibility in an end product;

creating a distillation and/or fermentation solubles-nutrient source mixture having an enhanced nutrient value by (a) adding one or more crude protein and/or amino acid content nutrient sources comprising canola meal, soybean meal, sunflower meal into the wet end of distillation or fermentation solubles based on the crude protein, UIP protein, amino acid content, UIP/RUP amino acid content of the added nutrient sources; and (b) adjusting the temperature and/or the moisture content of the enhanced nutrient value solubles-nutrient source mixture based on an empirical relationship that relates the UIP as a percent of the crude protein (CP) to an end product temperature to create an enhanced nutrient value by-product-nutrient source mixture of the distillation or fermentation byproducts to produce said end product having a crude protein content of over 30% on a dry matter basis of the end product composition, and (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, and (3) a post ruminal digestibility of the UIP/RUP of over 60%.

116. (Currently Amended) The method of claim 115, wherein the bypass protein (RUP/UIP) level of the end product that is over 50% and up to about 83% of the crude protein is increased to approximately 2.44 times the bypass protein (RUP/UIP) level in the solubles nutrient source mixture.

117. (Previously Presented) The end product made by the process of claim 114.

118. (Previously Presented) The end product made by the process of claim 115.

119. (Currently Amended) A system for predictably enhancing the nutrient value of distillers, brewers or fermenters solubles, and for producing a protein feed or feed supplement end product for ruminant animals having a crude protein content of over 30% on a dry matter basis of the feed or feed supplement end product composition, and at least one of (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) having a post ruminal digestibility of the UIP/RUP of over 60%, comprising:

system determining means for determining the desirable levels of crude protein, UIP/RUP, amino acids and post ruminal digestibility in an end product;

system determining means for creating a distillation and/or fermentation solubles-nutrient source mixture having an enhanced nutrient value by (a) adding one or more crude protein and/or amino acid content nutrient sources comprising canola meal, soybean meal, sunflower meal into the wet end of distillation or fermentation solubles based on the crude protein, UIP protein, amino acid content, UIP/RUP amino acid content of the added nutrient sources; and (b) system adjusting means for adjusting the temperature and/or the moisture content of the enhanced nutrient value solubles-nutrient source mixture based on an empirical relationship that relates the UIP as a percent of the crude protein (CP) to an end product temperature to create an enhanced nutrient value by-product-nutrient source mixture of the distillation or fermentation byproducts to produce said end product having at least one of a crude protein content of over 30% on a dry matter basis of the end product composition, and at least (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) a post ruminal digestibility of the UIP/RUP of over 60%

120. (Currently Amended) A system for predictably enhancing the nutrient value of distillers, brewers or fermenters solubles, and for producing a protein feed or feed supplement

end product for ruminant animals having a crude protein content of over 30% on a dry matter basis of the feed or feed supplement end product composition, and at least two of (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) having a post ruminal digestibility of the UIP/RUP of over 60%, comprising:

system determining means for determining the desirable levels of crude protein, UIP/RUP, amino acids and post ruminal digestibility in an end product;

system determining means for creating a distillation and/or fermentation solubles-nutrient source mixture having an enhanced nutrient value by (a) adding one or more crude protein and/or amino acid content nutrient sources comprising canola meal, soybean meal, sunflower meal into the wet end of distillation or fermentation solubles based on the crude protein, UIP protein, amino acid content, UIP/RUP amino acid content of the added nutrient sources to create an enhanced nutrient value by-product-nutrient source mixture of the distillation or fermentation byproducts; and (b) system adjusting means for adjusting the temperature and/or the moisture content of the enhanced nutrient value by-product-nutrient source mixture based on an empirical relationship that relates the UIP as a percent of the crude protein (CP) to an end product temperature are provided for producing said end product-having a crude protein content of over 30% on a dry matter basis of the end product composition, and at least two of (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, or (3) a post ruminal digestibility of the UIP/RUP of over 60%.

121. (Currently Amended) A system for predictably enhancing the nutrient value of distillers, brewers or fermenters solubles, and for producing a protein feed or feed supplement end product for ruminant animals having a crude protein content of over 30% on a dry matter basis of the feed or feed supplement end product composition, and a UIP/RUP content of over 50% and up to about 83% of the crude protein, amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, and having a post ruminal digestibility of the UIP/RUP of over 60%, comprising:

system determining means for determining the desirable levels of crude protein, UIP/RUP, amino acids and post ruminal digestibility in an end product;

system determining means for creating a distillation and/or fermentation solubles-nutrient source mixture having an enhanced nutrient value by (a) adding one or more crude protein and/or amino acid content nutrient sources comprising canola meal, soybean meal, sunflower meal into the wet end of distillation or fermentation solubles based on the crude protein, UIP protein, amino acid content, UIP/RUP amino acid content of the added nutrient sources; and

system adjusting means for adjusting temperature and/or the moisture content of the enhanced nutrient value by-product-nutrient source mixture based on an empirical relationship that relates the UIP as a percent of the crude protein (CP) to an end product temperature is provided for producing said end product-having a crude protein content of over 30% on a dry matter basis of the end product composition, and (1) a UIP/RUP content of over 50% and up to about 83% of the crude protein, (2) amino acid levels in the crude protein and in the RUP/UIP of greater than 1% methionine and 2% lysine, and a post ruminal digestibility of the UIP/RUP of over 60%.

122. (Currently Amended) The system of claim 119, wherein the system adjusting means is provided for providing a bypass protein (RUP/UIP) level of the end product that is over 50% and up to 83% of the crude protein is increased to approximately 2.44 times the bypass protein (RUP/UIP) level in the solubles nutrient source mixture.